

## TOXICITY OF *EQUISETUM* TO HORSES

A. Bebbington and B. Wright



**Figure 1.** Sterile stem of *Equisetum arvense*

Present and persistent since the Paleozoic era (250–540 million years ago), the plants of the genus *Equisetum*, commonly known as horsetail, are considered to be living fossils. These widespread, perennial, fern-like plants are found in most temperate areas of the world. They can have detrimental effects on horses if consumed in large quantities (e.g., 2 kg (4–5 lb) per day for a 454-kg (1,000-lb) horse, for 1–2 weeks).

The presence of *Equisetum* in pasture is not a primary concern, as consumption at pasture is usually limited by the plant's high silicate content and the abundance of other palatable forage options. However, ingestion of contaminated hay can result in poisoning. If horsetail is cut, dried and mixed in with hay in moderate levels (20%

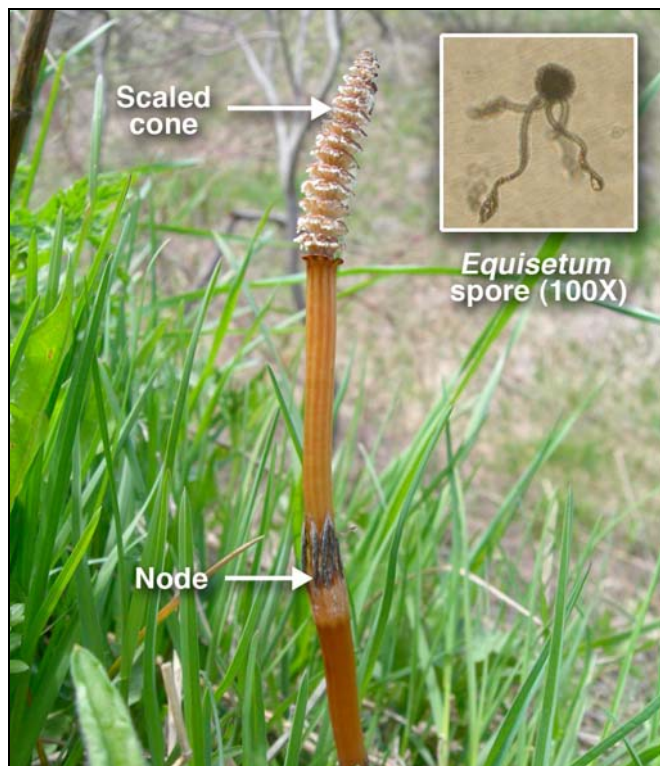
or more of the horse's dry-matter intake<sup>(1)</sup>), intoxication may occur within 1–4 weeks. There have been many investigations into the probable cause of toxicity. *Equisetum* contains various compounds, such as silicates, aconitic acid, palmitic acid, nicotine, 3-methoxyxypyridine, equisitine, palustrine, dimethylsulfone and thiaminase<sup>(1)</sup>. However, thiaminase is likely the primary source of symptoms in horses<sup>(2)</sup>. This anti-thiamine enzyme inhibits the production of vitamin B<sub>1</sub>, the vitamin responsible for extracting energy from carbohydrates, fats and proteins<sup>(3)</sup>. However, the relationship between low thiamine and the nervous signs observed in affected horses is poorly understood<sup>(3)</sup>.

### CLINICAL SIGNS

Symptoms of *Equisetum* poisoning are seen primarily in young, rapidly growing horses, but cases of poisoning have also been reported in cows and sheep. The development of symptoms of *Equisetum* poisoning initiates slowly. The first signs may be a general, scruffy physical appearance, weight loss (without a particular loss of appetite), diarrhea and slightly uncoordinated movements. If not treated, the disease will progress to a point where the horse will show a loss of muscular control, staggering gait and extreme balance issues. The horse is prone to become uneasy and nervous due to its inability to control muscle movement. It may lie down and not be able to get up, may seizure, and may ultimately die from exhaustion within approximately 1–2 weeks<sup>(2, 4)</sup>.

### TREATMENT

Early identification of the symptoms is critical in the treatment of *Equisetum* poisoning. If caught early, the source of *Equisetum* can be removed, and a full recovery can be expected with appropriate treatment. Thiamine (vitamin B<sub>1</sub>) may be administered, 500 mg–1 g/day intravenously, then intramuscularly for several days<sup>(4)</sup>. The best prevention is ensuring *Equisetum* is not present in hay. Becoming familiar with the appearance of normal, good-quality hay makes identifying foreign and potentially dangerous materials easier.



**Figure 2.** Fertile stem of *Equisetum arvense*

## IDENTIFYING EQUISETUM

*Equisetum* species are often found on sandy and gravelly, wet soils, such as in marshes, wet meadows, and the banks of streams, lakes and ponds. *Equisetum arvense* (Figures 1 and 2), also known as field horsetail, is the most common and variable species of horsetail. Typically, *E. arvense* can be identified early in the season by the presence of its fertile stem, which is approximately 6 in. tall, brown/beige in colour and has nodes that are encompassed by long, dark, clasping leaf sheaths<sup>(5)</sup>. Atop of the stem is a small, scaled cone, which holds hundreds of thousands of miniscule spores. The green, hollow, sterile stem, shown in Figure 1, is usually spotted in late spring and can reach up to 45 cm (18 in.) tall with numerous, thin, needle-like branches whorled around each node<sup>(5)</sup>. The plants have modified stems called rhizomes that grow laterally underground and produce numerous above-ground stems.

## CONTROL

The plant's persistent, rhizomatous, rooting system and its ability to produce mass amounts of spores from the fertile stem, make eradication of *Equisetum* difficult. Draining excess water from marshy areas will help, while cutting the identified fertile stems in the early spring before spore distribution is an optimal way of decreasing future populations. Increasing the fertility of the soil and improving drainage will encourage cultivated grasses and legumes to grow and out-compete *Equisetum*. In addition, increasing grass and legume concentration will lower the *Equisetum* portion of the dry-matter intake in hay. Herbicides, such as 2,4-D and MCPA, control *Equisetum* species when applied to the vegetative portions<sup>(6)</sup>. When applying any type of herbicide, it is important to read dilution and application instructions before use.

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